

TITLE; PROCESS FOR TREATING WATER WITH ULTRAVIOLET ACTIVATED OXYGEN
GAS USED DURING THE SOAK, GERMINATION, AND GROWING STAGES OF SEEDS AND
REMOVING A HAZARDOUS CONDITION BY REPLACING CHLORINE USAGE.

ABSTRACT

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A PROCESS FOR ACHIEVING A 5 LOG REDUCTION (99.9%) OF BACTERIA ON SEEDS USING
ULTRAVIOLET ACTIVATED OXYGEN GAS. THE SEEDS ARE IN A TANK AND THE GAS IS
INTRODUCED USING A SPARGING SYSTEM THAT ALLOWS THE GAS TO BE DELIVERED IN
20 to 60 MICRON SIZE BUBBLES FOR GREATER CONTACT AREA BETWEEN THE SEED AND
GAS, ALLOWING THE ACTIVATED OXYGEN TO REDUCE BACTERIA FAST AND
EFFICIENTLY. ALSO, THE WATER IS SATURATED WITH ULTRAVIOLET ACTIVATED
OXYGEN FOR USE IN GERMINATING AND AIDING IN GROWING PROCESSES.
THIS REDUCTION OF BACTERIA RESULTS IN EXTENDED SHELF LIFE AND NO
CHLORINE IS USED

ULTRA VIOLET ACTIVATED OXYGEN IS DEFINED AS:

ASSUMING AMBIENT AIR HAS 21% OXYGEN CONTENT, FOLLOWING IS THE TYPES
OF GASSES CREATED BY THE ULTRA VIOLET LAMP (185 NANOMETER) FROM THE
21% OXYGEN.

HYDROXY RADICAL	2%
ATOMIC OXYGEN	0.5%
HYDROGEN PEROXIDE	6%
HYDROPEROXY RADICAL	2%
HIGHER PEROXIDES	7%
OZONE	2%
UNKNOWN	1.5%

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DESCRIPTION

FIELD OF INVENTION

- A. ACTIVATED OXYGEN HAS BEEN USED SINCE 1982 FOR BACTERIA REDUCTION IN HYDROPONIC OPERATIONS
- B. ACTIVATED OXYGEN HAS BEEN SED SINCE 1982 TO REDUCE PESTICIDES, BIOCIDES, RODENTCIDES, VOC'S ETC. ON FRUIT (APPLES ORANGES, PEARS, ETC).
- C. ACTIVATED OXYGEN HAS BEEN USED SINCE 1996 AT AN ALFALFA SEED FACILITY FOR BACTERIA REDUCTION
- D. IN 1996 SPECIFIC TESTING WAS DONE AT AN ALFALFA SPROUT FACILITY IN HAWAII USING THE ACTIVATED OXYGEN TO REDUCE BACTERIA AND AID IN CONTROL OF BACTERIA DURING GERMANATION AND GROWTH PERIOD.
- E. IN 1996 SPECIFIC TESTING WAS DONE AT A HYDROPONIC FACILITY IN HAWAII TO REDUCE BACTERIA AND ALGAE GROWTH AND DECREASE WATER SURFACE TENSION (TO ENHANCE OXIDATION OF MICRO NUTRIENTS AND FOR BETTER ASSIMILATION BY THE ROOT SYSTEM).

DESCRIPTION OF RELATED ART

- 1. A. ACTIVATED OXYGEN HAS BEEN USED SINCE 1982 TO REDUCE BACTERIA ON THE EXTERIOR OF VEGETABLES (IE. TOMATO, PEPPER, CELERY, ETC)

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AND TO EXTEND SHELF LIFE.

B. ACTIVATED OXYGEN HAS BEEN USED SINCE 1988 TO REDUCE BACTERIA IN
FRUIT JUICES. (ORANGE, CRANBERRY, PRUNE, ETC) IN MICHIGAN.

CROSS REFERENCE TO RELATED APPLICATIONS---NOT APPLICABLE
STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH ---NOT APPLICABLE
REFERENCE TO MICROFICHE---NOT APPLICABLE

SUMMARY

1. BASED ON TECHNICAL INFORMATION OBTAINED FROM ACTIVITIES STATED IN "FIELD OF INVENTION" AND "DESCRIPTION OF RELATED ART" AND ON TESTING SINCE 1985 A SPECIFIC PROTOCOL HAS BEEN FORMULATED TO EFFICIENTLY AND AT A LOW COST REDUCE THE BACTERIA FROM VEGETABLE SEEDS USING ACTIVATED OXYGEN AND AT THE SAME TIME EXTEND SHELF LIVE.
2. AT PRESENT THE ONLY FDA APPROVED METHOD TO OBTAIN A 5 LOG REDUCTION IS TO SOAK THE SEED IN A 20,000 PPM CHLORINE SOLUTION. (THIS VERY HIGH CHLORINE CONCENTRATION HAS MANY DRAWBACKS):
 - A. INHALING IS HAZARDOUS TO PERSONNEL.
 - B. STORING/HANDLING CAN BE HAZARDOUS TO PERSONNEL AND CAUSE EXTRA EXPENSES (INSURANCE, SPECIAL CLOTHING ETC).
 - C. AFTER THE SOAKING PROCESS, WITH A CHLORINE SOLUTION THE SEEDS REQUIRE A MINIMUM 3 RINSES TO 5 RINSES TO REMOVE THE CHLORINE RESIDUE. THIS IS AN ADDED EXPENSE, AND IF THE RINSE WATER IS CONTAMINATED YOU HAVE INTRODUCED ANOTHER PROBLEM (THE EXTRA COST INVOLVED IN REMOVING THE CHLORINE FROM THE WATER

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BEFORE DISCHARGING INTO THE SEWER).

D. THE EXTRA COST OF CHLORINE

3. DURING HYDROPONIC OPERATIONS WHEN WATER IS SATURATED WITH ACTIVATED OXYGEN THE SURFACE TENSION IS LOWERED (THIS MAKES IT EASIER FOR THE ROOTS

TO ACCESS THE MICRO NUTRIENTS IN THE WATER). ALSO, THE ACTIVATED OXYGEN SATURATED WATER WILL OXIDIZE THE NUTRIENTS IN MAKING IT EASIER FOR THE ROOTS TO ASSIMILATE THE NUTRIENTS.

4. IT HAS BEEN OBSERVED THE SHELF LIFE OF THE PRODUCT IS EXTENDED.
5. THE ACTIVATED OXYGEN SYSTEM REQUIRES NO CHEMICALS OR ADDITIVES.
6. THE ACTIVATED OXYGEN SYSTEM REQUIRES MINIMAL MAINTENANCE
7. THE ACTIVATED OXYGEN SYSTEM REQUIRES MINIMAL OPERATING COST.
8. THE ACTIVATED OXYGEN SYSTEM DOES NOT REQUIRE HIGHLY SKILLED WORKERS
9. THE ACTIVATED OXYGEN SYSTEM DOES NOT REQUIRE CONSTANT MONITORING
10. ALSO, SINCE THERE IS NO NEED FOR CHLORINE, THE EPA/OSHA REQUIREMENTS FOR A SAFE WORK PLACE ENVIRONMENT ARE EASILY MET.

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